48·5 per cent. of K_2O, and kainit, a mixture of the chlorides and sulphites of potassium, magnesium, and sodium, containing on an average 12 per cent. of K_2O. Against these, a mica schist with only 3 per cent. of K_2O does not look very promising at first sight, and nothing but well-conducted vegetation experiments will show exactly what value the mineral does possess. Of course, if the technical chemist can find some easy way of making the sulphate or chloride, the whole aspect of the problem changes. Dr. Voelcker has experimented at Woburn since 1911 with various potassic minerals, felspars, phonolite, granite, etc., to see if any of them possessed fertilising value, but so far the experiments have been without success. There is no experimental foundation for the suggestion sometimes made that these minerals might prove useful on poor soils by the slow liberation of potash. As a matter of fact, potash is most needed by plants on light, dry soils, and in these the decomposition of a complex silicate could scarcely be expected to proceed rapidly.

NOTES.

THE death of the Rt. Hon. Charles Booth, F.R.S., in his seventy-seventh year, is a loss to the community of a munificent and judicious philanthropist, a pioneer in statistical and sociological work, a writer and speaker of force and attraction, and a sympathetic and practical economist. He published in 1889 the first volume of his series of studies of "Life and Labour of the People," a work which (as the *Times* truly says) "for nearly a generation profoundly affected public opinion on social questions." His method was to employ trained investigators, who should ascertain the precise facts about the means of living and the general conditions of labour in each part of the district under consideration, and to group the results into classes, graduated according to the resources possessed and the manner in which those resources were applied. The task occupied him seventeen years, and called for an elaborate organisation and a large expenditure of time and money. His services to statistical science were recognised by the award by the Royal Statistical Society of its gold medal in 1892, by his election to the presidency of that society from 1892 to 1894, and by the fellowship of the Royal Society. His services to the public were recognised by the coveted honour of a summons to the Privy Council, and by honorary degrees from the universities of Oxford, Cambridge, and Liverpool. He was an original member of the Sociological Society, and presided at two meetings when Prof. Geddes developed his views on civics. He advocated a scheme of universal non-contributory pensions, and when he was asked to help Sir Edward Hamilton's Committee on that subject he readily consented, and attended a meeting of that committee, giving advice which was found of great practical value.

SIR HIRAM S. MAXIM, one of our greatest inventors, died on November 24, at his home at Streatham, after a short illness. Born in 1840, in the State of Maine, he had a childhood and youth of hard work, like the majority of young Americans of that time. In his autobiography he recounts with pride how he picked up many trades and became skilful in the use of tools. Everything gave him occasion for thought and invention, and it was of his early inventions that he was proudest. Before the age of forty he invented mouse-traps, gas machines, fire sprinklers, a steam-trap, locomotive headlights, electric lights, dynamo machines, and many other things. It is by the first automatic gun—the Maxim—a gun with a single barrel which discharged more than 600 ordinary rifle shots per minute, exhibited thirty-two years ago, that he is best known to the general public. For the next twenty years his time was mainly taken up in developing automatic guns of much greater size, and these are now used by all the nations. He had a good working knowledge of physics and chemistry. He made discoveries about explosives, and seems to have been the first inventor of a smokeless gunpowder. He seems also to have been the first to see clearly the principle on which aeroplanes are worked, and he spent a great deal of money in finding out the horizontal speed required to give to inclined planes a definite amount of lifting power. His difficulty lay in the great weight of the necessary steam-engine and boiler. The later invention of the petrol engine easily made the aeroplane a real flight machine. He made his permanent home in England in 1882, and became a British subject. He was knighted in 1901. A review of his autobiography will be found in NATURE of April 22, 1915. Scientific men, engineers, and inventors used all to start as amateurs; Maxim was nearly the last of these men of great originality. It will be interesting for our successors to notice whether the more orthodox training now in vogue tends better to develop originality or to destroy it.

THE second annual report of the Medical Research Committee, National Health Insurance, has just been issued, and deals with the year ending September 30, 1916. In the introduction it is stated that the schemes for medical research in special directions, framed originally with a view to peace conditions, have for the greater part been suspended, and almost the whole of the available funds and scientific resources have been applied to the solution of medical questions of immediate national urgency in war-time. The summary of research work carried out is divided into three sections—that of the Central Research Institute, Mount Vernon Building, Hampstead, and affiliated laboratories, pre-war schemes for research, and work in connection with the war. In the department of biochemistry much work has been done on the treatment of amœbic dysentery with emetine, and as an outcome a double iodide of emetine and bismuth has been introduced by Dr. Dale, and appears to be a valuable drug in the treatment of carriers. Investigations are also in progress by Dr. Barger and Dr. Ewins on organic arsenic compounds with a view to improvement of such remedies as atoxyl and salvarsan. Dr. Leonard Hill and his staff have carried out investigations on the hygiene of munition factories, on dangerous dusts and vapours, and on poison gases. Several pre-war researches on tuberculosis have been continued, and rickets, diabetes, diseases of the heart, anaphylaxis, and the sterilisation and contamination of milk are being investigated at several centres. As regards work in connection with the war, the Army medical statistics are being compiled by the committee at their statistical department under the direction of Dr. Brownlee. The treatment of infected wounds and the study of antiseptics are being carried out by the staff of the bacteriological department under the direction of Sir Almroth Wright. Dr. Dakin devised his antiseptic solution of sodium hypochlorite, and as a result of his work on this substance and in collaboration with Prof. Cohen introduced chloroamine T (toluene sodium sulphochloroamide), a new and potent antiseptic. Typhoid, paratyphoid, and dysentery infections, trench nephritis, cerebro-spinal fever, and disorders of the soldier's heart are a few of the other subjects dealt with. The report gives an excellent summary of the researches, and is all the more useful as full references are given to the original papers in which they appear. Lord Moulton, Sir Clifford Allbutt, and Prof. Hay retire from the committee, and their places are taken by Viscount Goschen, Dr. Chalmers, and Prof. Murray, and Major Waldorf Astor, M.P., becomes chairman.

The death is announced from Paris of the Vicomte M. de Vogüé, a member of the French Academy, and a well-known writer and diplomat. Born in 1848, the late Vicomte served in the war of 1870, and afterwards entered the diplomatic service, and held appointments successively at Constantinople, Cairo, and Petrograd. In 1873 his "Voyage en Syrie et en Palestine," published in the *Revue des Deux Mondes*, attracted much attention. He also edited a posthumous work of the Duc de Luynes entitled "Voyage d'exploration à la Mer morte, à Petra, et sur la rive gauche du Jourdain." The Vicomte de Vogüé was the author of several historical and other volumes, and did much to awaken French interest in the intellectual life of Russia. Since the outbreak of war he had been president of the Société de Secours aux Blessés.

The French Academy of Sciences has just lost a member by the death of M. Léauté. Born in 1847, M. Léauté left the Polytechnic School as a Government industrial engineer (*ingénieur des manufactures de l'Etat*), and eventually became Director of Telephones. After writing some early papers on pure mathematics, he devoted himself to theoretical mechanics, and wrote important papers on linkages, transmission of power by cables, and regulators of hydraulic and other machines. By means of a differential equation and an associated graph, he successfully attacked the problem of the dangerous long-period oscillations of hydraulic machinery. In announcing his death to the Academy, the president directed attention to the fact that "his work is the best reply to those who fancy that theory and practice are irreconcilable, and that 'savants' cannot render any useful service for the advance of industry, even if it is granted that they do not actually retard it."

A small committee has been formed in Glasgow for the procuring of a suitable local memorial of the late Sir William Ramsay. It is proposed that the memorial shall be placed in the University buildings, perhaps in the Department of Chemistry. Ramsay was born in Glasgow, and received his education at the Academy and the University. For eight years he held, in succession, the posts of assistant in the Young Laboratory of Technical Chemistry, and tutorial assistant to the Regius professor of chemistry, the late Dr. John Ferguson. He left Glasgow in 1880 to become professor in University College, Bristol, but he always maintained close relations with the city and with the University, from which he received the honorary degree of Doctor of Laws. Lady Ramsay is a member of a well-known Glasgow family. The proposal of the Memorial Committee has received a large measure of support, and it has been thought expedient to limit the subscription to two guineas. Mr. H. B. Fyfe, B.L., of 115 St. Vincent Street, Glasgow, is acting as treasurer of the fund.

Applications for the Government grant for scientific investigations for 1917 must be made on printed forms obtainable from the clerk to the Government Grant Committee, Royal Society, Burlington House, W., and returned to reach the offices of the society by, at latest, January 1.

To commemorate the fiftieth birthday of Dr. Sam. Eyde, the Norwegian inventor, the sum of 100,000 kroner has been set aside by the Norwegian Hydro-Electric Nitrogen Company for the formation of a Sam. Eyde Fund to be devoted to the advancement of chemical and physical research. The fund is to be administered by the Board of the Nansen Fund.

The death, on November 20, is announced, from wounds received on October 1, of Lieut. Corin H. B. Cooper, R.E. Mr. Cooper, after graduating in science at McGill College and University, Montreal, specialised in geology, and acted for a time as demonstrator under Profs. Adams and Bancroft at McGill University. At the outbreak of the war he was engaged on Government survey work in the oilfields of the Rocky Mountains.

We regret to see the announcement of the death on November 23 of Mr. Charles Umney, the pharmaceutical chemist, in his seventy-fourth year. He was chairman of the Chemical Section of the London Chamber of Commerce, and we learn from the *Chemist and Druggist* that a measure of his ability and power was then afforded when he took Revenue representatives into his firm's laboratories in order to watch the experiments that he devised and carried out for the purpose of ascertaining the loss of spirit in making liquid galenicals. Upon these experiments was based the rebate on exportation of spirituous medicinal preparations under drawback. As a pharmacist pure and simple his history may be found in the records of the Pharmaceutical Society and the British Pharmaceutical Conference. For many years he was one of the society's examiners. He worked for the conference as a paper contributor, a debater, member of the committee, and in 1884 he became the treasurer, holding that office until, in 1888, he was appointed president of the body, holding the office at Newcastle-upon-Tyne in 1889 and at Leeds in 1890.

The death of Mr. R. F. Mann, at the age of thirty-five, occurred on November 17. Mr. Mann had been an X-ray operator at the Middlesex Hospital during the last seventeen years. He was the inventor of one of the earliest forms of localisers for use in the removal of foreign bodies from the limbs. In the years when the effects of X-rays upon malignant disease were being investigated, the risks to which the operators were subject were not known, and it was during this period that he contracted X-ray dermatitis, which had a malignant termination. He underwent numerous operations during the last eight years, but bravely and loyally held to his work. Since the outbreak of war he had, in fact, added to his work by undertaking the radiographic work at the Branch Military Hospital at Clacton (Middlesex Hospital), and later in connection with the Duchess of Bedford's Military Hospital at Woburn.

The death, by accident, at Hadley Wood railway station, is announced of Capt. W. H. Jaques, of the United States Navy, known for his scientific work in connection with ordnance engineering and the production of early submarines. Capt. Jaques was born in Pennsylvania on December 24, 1848, and graduated at the U.S. Naval Academy in 1867. He was an assistant on the U.S. Coast Survey in 1870–74; with the New York Board of Education, 1874–78; secretary of the U.S. Gun Foundry Board, 1883–85; and secretary of the Senate Commission on Ordnance and Warships, 1886–87, when he became superintendent of the gun factory at the Bethlehem works of the Carnegie Steel Co. Capt. Jaques was a member of the Institution of Civil Engineers, the Institution of Mechanical Engineers, and the Iron and Steel Institute, and an associate member of the Institution of Naval Architects. His scientific work was concerned chiefly with the manufacture of heavy ordnance, armour, torpedoes, and solar evaporators, and he invented the double-forging process of armour and other improvements in its manufacture.

THE President of the Board of Agriculture desires to direct public attention to the urgent need that exists for the assistance of women, not already connected with agricultural industry, in the work that is required for food production on the land, and to replace agricultural labourers who have been called up for military service. Hundreds of women have already rendered valuable service in maintaining the home-grown food supply, but thousands are now needed to meet the national emergency. Educated women are especially invited to offer their services, and short courses of training can be provided for them. Application should be made to the secretaries of the Women's War Agricultural Committees in the various counties, or to the Women's National Land Service Corps, 50 Upper Baker Street, London, N.W.

THE collections of the State Natural History Museum of Sweden have for some time past been in process of transference from their old quarters in Drottninggatan, Stockholm, to the fine new building in the suburb of Frescati, where they have been rearranged in accordance with modern ideas, special attention being paid to the education of the public. At intervals during the present year the palæontological, zoological, and mineralogical collections have been made accessible. The botanical galleries have just been completed. On November 13, in the presence of the Crown Prince and other royalties and many notabilities, the whole of the public galleries were declared open by the King of Sweden, who conferred distinctions upon the director of the museum, Prof. Einar Lönnberg, the vice-director, Prof. Hjalmar Sjögren, and the architect of the museum, Mr. A. J. Anderberg.

THE first meeting of the current session of the Royal Society of Arts was held on November 15, when Dr. Dugald Clerk, the chairman of the council, delivered his inaugural address on some conditions of the stability of the British Empire. Dr. Clerk illustrated the economic strength of the United Kingdom by the growth of her trade, her capital, and her income; he indicated the relative weakness of Germany by comparative statistics of a similar character. While honouring Mr Hughes, the Premier of Australia, for his courage and his enthusiasm, he urged a broader and bolder policy. "No, the Colonies are wrong in the idea of a self-contained Commonwealth, and Britain is right in her idea of expansion in trade over every part of the world." Then turning to the fountain-head of the prosperity he anticipates, he urged with strength and conviction the necessity of two things, generous payment of labour, and generous work by labour. Both his optimism and his courage were inspiring, and it would, perhaps, have been an artistic error to have pared the imperfections from a fact or modified the meaning of a figure. But in our moments of cooler thought it is well to remember that figures showing the growth of a country's wealth must be read together with the curve of money values, that the national incomes of any two countries are dangerous insimilitudes, and that, whatever our income in war-time may be in terms of money, it is, in fact, what Mr. Flux has well called "an inflated expression in money of a reduced income in goods."

DR. ELSIE CLEWS PARSONS describes, in the November issue of *Man*, a method for the detection of crime among the Zunis. Anyone could use this method with the curious condition that he had never been bitten, a disqualification which appears in other Zuni rites. The detective, who is by profession a seer, takes a dose of a narcotic, and during the trance which follows a picture of the situation or incidents by which a missing article has been mislaid or stolen will unfold itself to him. So fully is this believed that a thief will smoke during the act of stealing so that the smoke may surround his head and prevent identification. The narcotic used is known as the Jamestown weed (*Datura meteloides*). An overdose is exceedingly dangerous, and the seer who takes it for the purpose of detection suffers for some time; his head and eyes are heavy, his nerves on edge, and though the fee charged for his services is considerable, one practitioner has retired from business, and recently declined to act in the case of a lost horse.

WHILE it has long been known that the woodcock carries its young, not merely under the spur of sudden emergency, but as a matter of everyday practice, when the feeding ground is distant from the nest, this does not appear to be the case with the snipe. At need, however, it is clear that this species will also bear its young aloft to a place of safety. A brief but vivid description of the manner in which this is done appears in the *Irish Naturalist* for October, by Mr. W. J. Nash, who saw a snipe rise from a mud-bank in a bog drain near Lissoy carrying a young one, which was set down some thirty yards off. It seemed to fly with considerable difficulty, and before it alighted the young one was dangling down, held, apparently, by the head only, and seemed to be slipping from its parent's grasp. The burden seemed to be supported by both bill and feet. Another nestling of about three days old was discovered, just dead from drowning, beside the spot from which the first had been rescued. The young birds had, it is surmised, been driven into the water by fright, caused by a dog which was hunting near the spot alone when the narrator arrived. From the evident labour of the parent in the performance of this rescue work it seems clear that such flights are but rarely undertaken, while the woodcock is an adept from long practice.

THE fifth and last of Mr. J. H. Owen's valuable series of notes on the breeding habits of the sparrow-hawk appears in the October issue of *British Birds*. These notes are the result of long and patient observations from a concealed hut, and are illustrated by some very remarkable photographs. While it is a matter of common knowledge that this bird will use the deserted nest of another hawk, of a crow, or of a wood-pigeon, this is the case only when its own nest has been destroyed, and not, as is generally supposed, as a matter of caprice. As soon as the young are hatched it seems to be a common practice for the female to eat the empty eggshells, though as often perhaps they are carried away and dropped at a distance from the nest. How greatly fertility is reduced by the strain of increased egg production is shown by the author's observations to the effect that if the first clutch be removed more than 25 per cent. of the second will prove infertile, while the number of eggs in the clutch is also reduced. Late in December, or early in January, these birds will often build flimsy platforms, which are supposed to be used solely for the purpose of dining-tables, though in many cases, it would seem, they serve neither this nor any other purpose. Possibly it would be more correct to regard them as indications of an incipient sexual activity.

THE timber resources of South America are discussed by Mr. Raphael Zon in the *Geographical Review* for October, 1916 (vol. ii., No. 4). South America is principally rich in hardwoods, of which the so-called

Spanish cedar (*Cedrela odorata*) and the *quebracho* are the most important. These are more than sufficient to meet the home demand, and are largely exported, but at the same time short-sighted exploitation bids fair to impair seriously this industry. On the other hand, it is, of course, quite possible that further study of the timber resources will result in the discovery of other hardwoods of commercial value. Of more economic importance is the supply of softwoods. The Parana pine (*Araucaria brasiliensis*) of southern Brazil and the Chilean pine (*A. imbricata*) seem to be the only two species of importance, and are being increasingly used in place of imported coniferous wood from the northern hemisphere. But the limited area of these softwoods and the growing demand for cheap timber make it improbable that South America can ever dispense with her timber imports, and certainly there is no hope of her being able to export softwoods. In view of this paucity of timber there is urgent need of the South American States instituting scientific management of their forests and the prevention of undue exploitation. South America is far less rich in commercial timber than might be supposed, and her resources are not inexhaustible.

THE retreat of the Barry glacier in Prince William Sound, Alaska, has been studied for many years. In 1910 the National Geographic Society's expedition showed that the face had withdrawn three miles since 1899. This expedition gave an exhaustive account of all observations previous to 1910. Later observations are contained in a brief paper by Mr. B. L. Johnson, published as Professional Paper 98 C of the United States Geological Survey. Mr. Johnson visited the glacier in 1913 and 1914, and found in both years that the rate of retreat had been maintained. Between 1910 and 1914 the rate of retreat was 8200 ft. on the eastern side, and about 2500 ft. on the western side. The rate on the western side seems to have decreased after the uncovering of bedrock on that side. The paper is illustrated with several photographs of the glacier in various stages of its retreat.

SOME details of the Indo-Russian triangulation connection are given in the *Geographical Journal* for November (vol. xlviii., No. 5). By 1911 Gilgit had been connected with the Indian system, and the Russians on their side had reached Pamirski port in about lat. 38° 13′ N., long. 75° E. But the connection of Gilgit with the Russian survey across a strip of Afghan territory presented difficulties of a formidable nature, as it involved the crossing of the Karakorams. The only feasible route was from Gilgit up the Hunza valley to the Kilik Pass, involving the survey of about one hundred miles up a narrow, precipitous-sided gorge, flanked by mountains rising 6000–7000 ft. above the valley floor. The number of stations in this survey was thirty-three, and their average height is 16,222 ft. The work was carried out in the face of great difficulties and hardships by the late Lieut. H. Bell, R.E., in 1911 and 1912, and completed by Lieut. Mason in 1913. A report of the work is contained in the Records of the Survey of India, vol. vi. Capt. R. W. Hingston, I.M.S., has some notes of the geology and climate, as well as a valuable paper on his observations of blood at high altitudes.

SOME observations on the *bai*, or so-called "sand-mist," a phenomenon of frequent occurrence in the Far East, are contributed by Prof. Yuji Wada to *Temmon Geppo*, the organ of the Astronomical Society of Japan (vol. ix., No. 6, August, 1916). The mist, which is ascribed to an atmospheric depression over the sandy Tsai-pih district of Central China, is prevalent in spring. In winter the ground is frozen, and in summer it is knit together by grass, but between these seasons the loose surface is churned up by the wind and clouds of sand rise to a great height and are carried eastward, afterwards collecting moisture and falling as a coloured mist. During the fall the sun is obscured and objects assume a yellow or ashy hue, the conditions closely resembling those attending a solar eclipse, for which the phenomenon was often mistaken by ancient chroniclers. Characteristic of the *bai* is the thick coating of very fine yellow dust which settles everywhere. During a sand-mist at Chemulpo on March 4, 1915, the author measured a fall of sand on a sheet of glass in an underground chamber protected from the wind. A twenty-four hours' deposit on 118·6 sq. cm. weighed one centigram. On the same day a fall of $\frac{1}{4}$ in. was recorded in Etchu province, Japan. Sometimes the sand descends in a rainstorm. An instance is cited of a violent storm of orange-coloured rain in 1306, which caused the deaths of many persons and cattle. The author concludes that the *bai* is akin to the "blood rain" and "red snow" familiar to European meteorologists.

THE July issue of the *Agricultural Journal of India* (vol. xi., part 3) contains an article on "Photographic Illustration," by Mr. C. M. Hutchinson, which will be very helpful to the many scientific workers whose imperfect acquaintance with the limitations of the half-tone process of reproduction of photographic illustrations has so often led to unexpected disappointment. The questions of lighting, exposure, development, class of plate, and use of light filters are discussed and well illustrated by an excellent series of reproductions.

THE last two parts of the Edinburgh Mathematical Society's Proceedings (May and September, 1916) contain the usual amount of interesting matter. Perhaps the most important paper is that of Dr. J. Dougall on the solution of Mathieu's differential equation; this equation is important for physical applications, and Dr. Dougall has found solutions adapted for computation. Possibly they are not the proper analytical forms; these may be quotients of integral functions, as in the case of the proper representation of the elliptic functions; but the paper certainly shows an advance on the practical side. Other papers deserving attention are Mr. Brown's on Fourier's integral, Mr. Milne's on differential equations, Mr. D. G. Taylor's on linear substitutions, and Mr. Tinto's on space transformations. We have also received Nos. 19 and 20 of the same society's *Mathematical Notes*; they show that the study of mathematics at Edinburgh is in a very healthy condition, and contain a number of elegant demonstrations.

THE researches of Prof. Kamerlingh Onnes have shown that at temperatures below 4° or 5° on the absolute scale mercury, tin, and lead have extremely small electrical resistances. If the temperature of a wire of either of these materials in this super-conducting state is gradually increased, at a certain temperature known as "the critical temperature" the resistance rapidly increases. If the wire is subjected to a magnetic field this critical temperature is lower than it is in the absence of a field. If the current used in testing the resistance is increased, the critical temperature is also lowered. In the Journal of the Washington Academy of Sciences for October 19 Mr. F. B. Silsbee, of the Bureau of Standards, makes use of the experimental data available to show that the effect of the increase of the testing current on the critical temperature is due entirely to the magnetic field that current produces. This accounts for the differences observed in the effect of the current according to whether the wire used in the tests is straight or coiled. If further work supports Mr. Silsbee's theory, it should afford a clue to a more satisfactory explanation of the super-conducting state.

We have received a little book by Mr. J. W. Giltay dealing with bow instruments from a physical point of view ("De Strijkinstrumenten uit een natuurkundig oogpunt beschouwd"; Leyden, 1916, pp. xi+103, illustrated). It is a simple description of the action of the various parts of the violin, with a reference here and there to other bowed instruments. An elementary knowledge of acoustics is assumed. The book should appeal in the first place to musicians taking a scientific interest in their instruments, and in the second place to physicists. For the most part the author describes and discusses the results of earlier workers, especially those of Savart, Helmholtz, and Sir William Huggins, but he has also included a number of his own experiments, particularly on the effect of the air volume enclosed in the sounding-box. He is not convinced that a violin improves by being played upon.

The "Catalogue (No. 369) of Miscellaneous Literature" just issued by Mr. F. Edwards, of High Street, Marylebone, though mainly consisting of books of general interest, contains particulars of several works appealing to readers of Nature—on botany, travel, and, notably, natural history. The catalogue directs attention to many publications of the Zoological Society of London, offered, for the most part, at greatly reduced prices.

OUR ASTRONOMICAL COLUMN.

Ephemeris of Comet 1916*b* (Wolf).—After having passed conjunction, this comet will again be in a favourable position for observation as a morning star during the winter and spring. The following ephemeris for Greenwich midnight is given by Mr. R. T. Crawford in Lick Observatory Bulletin No. 286:—

	R.A.			Decl.	
	h.	m.	s.	°	′
Dec. 1	15	10	4	−5	13
10		25	10	5	37
20		42	39	5	56
30	16	0	53	6	5
Jan. 9		19	50	6	2
19		39	32	5	46
Jan. 29	16	59	56	−5	15
Feb. 8	17	21	2	4	28
18		42	49	3	24
28	18	5	13	2	1
Mar. 5		16	38	1	12

The values of log Δ on December 1, December 31, February 1, March 1, are 0·5829, 0·5237, 0·4434, 0·3623 respectively. Taking the brightness at discovery on May 10 as unity, the theoretical brightness on these dates is 3·0, 4·9, 8·8, and 15·6. The path of the comet during the above period is mainly through Ophiuchus.

The Great Red Spot on Jupiter.—This planet being now favourably visible in the evening sky, observations can be conveniently made of the surface markings, which are very abundant and diversified at the present time. The red spot is smaller than formerly, and the hollow in the great S. equatorial belt less prominent. The first-named object will be central at about the following times:—

		h.	m.
Dec. 3	...	9	35
4	...	5	26
6	...	7	4
8	...	8	43
10	...	10	21
11	...	6	12
Dec. 13	...	7	50
15	...	9	28
18	...	6	59
20	...	8	37
27	...	9	23
30	...	6	52

Mr. F. Sargent, of Bristol, who has been observing this planet with considerable success in recent years, informs Mr. Denning that the large dark spot in the S. tropical zone, known as the "south tropical disturbance," is now about 120° long, so that it extends over one-third of the circumference of Jupiter. The middle of this "disturbance" follows the middle of the red spot about two and a half hours, and the preceding end of the former may be expected to overtake the following end of the latter at the end of January. Since June, 1914, the rate of rotation of the red spot has been about 9h. 55m. 37s., and this rate may be expected to exhibit an acceleration next year when involved with the S. tropical disturbance.

The Meteoric Shower from Biela's Comet.—Though no rich display occurred this year, it is interesting to note that this shower visibly returned. Between November 20 and 24 ten slow meteors were recorded giving a fairly well-defined radiant at 27°+42° near γ Andromedæ. These meteors were seen by various observers, including Mr. Denning at Bristol, Mrs. Wilson at Totteridge, Miss Cook at Stowmarket, and Miss Strover at Bexley Heath. It seems probable that a few of these Andromedids are visible every year, and that meteors are distributed completely around the cometary orbit, though sparingly in sections of it.

The Colours of Stars in Globular Clusters.—Dr. Shapley has recently obtained further important data relating to the colour-indices of stars included in globular clusters (Proc. Nat. Acad. Sciences, vol. ii., p. 525). The stars in a cluster of this type may be supposed to be at sensibly the same distance from the earth, and apparent magnitudes may accordingly be assumed to be directly proportional to the total light emitted. In four clusters which have now been fully investigated, it has been found that the average colour-index is distinctly greater for the brighter stars than for the fainter ones, or that relatively high luminosity is accompanied by greater redness. The total light emission of the bluer stars, for which the surface temperature is presumably in excess of 10,000° C., thus appears to be less than that of many of the redder stars, which have surface temperatures only half as great. Since the emission per unit area is much less for the red than for the bluer stars, it follows that in the clusters investigated the volumes of the bright redder stars are very great in comparison with those of the stars which are fainter and relatively blue. The ancestral relationships of the two classes must be accounted for in any satisfactory hypothesis of the evolutionary sequence of spectral types.

FOSSIL VERTEBRATE ANIMALS.

The American Museum of Natural History, New York, has lately issued a fifth volume of papers on fossil vertebrata, reprinted from the Bulletin of the museum for the years 1913–14. It has long taken a leading place in researches of the kind here detailed, and the new contributions to our knowledge of many groups of extinct vertebrate animals are of the usual interest and importance. Besides the members of the staff, the authors include other well-known American palæontologists, while Dr. Robert Broom and Baron F. von Huene make specially interesting contributions, having studied the American fossils after their long experience of corresponding specimens from South Africa and Europe. Dr. Broom has, indeed, furnished the American Museum with a large collection of South Africa Permo-Triassic reptiles for comparison with the contemporaneous American groups, and he describes many of his specimens in the volume before us.

Several studies of the early reptiles and labyrinthodonts are appropriately followed by Dr. Broom's discussion of the structure and affinities of the Mesozoic multituberculate mammals and their rare Eocene successors. His description of a new skull of Polymastodon is especially interesting, and he agrees with the usual opinion that some of the herbivorous multituberculates were the ancestors of the existing monotremes. The latest forms of extinct land-reptiles from